

STANDARDS BUREAU REPORTS FOR YEAR

Finds New Measure for Light; Says Metallurgy Advances

A varied list of achievements in the field of applied science is cited by Director George K. Burgess of the United States Bureau of Standards in his annual report to the Secretary of Commerce. Dr. Burgess is a member of the A. S. S. T. and served as president in 1924.

One of the most important developments reported is the realization of a new absolute standard of light, which it is believed will eventually supplant the artificial standards of candle power, such as carbon lamps now used by the various nations. The new standard involves a measurement of the brightness of the interior of a small tube of refractory material immersed in a bath of pure platinum. This brightness has been found to equal 58.84 candles per square centimeter.

The difficulties attending the actual setting up of this standard have been very great, but the process has finally been reduced to mere laboratory routine. This standard may be accepted by the International Committee on Weights and Measures as a new international standard of light.

In the engineering world, an event of great significance was the signing by President Hoover on May 14 of a bill creating a national hydraulic laboratory to be located at the Bureau of Standards. This laboratory will study fundamental problems of hydraulics including flow of rivers and open streams, and will test all kinds of hydraulic machines and instruments.

The Bureau also found that owing to the low ductility of certain kinds of steel at the temperatures at which rails are rolled, there is a tendency within the rails for the formation of nuclei from which transverse fissures may later develop in service. Certain changes in the manufacturing procedure have now been suggested to correct this tendency.

The number of tests completed by the Bureau during the year was 200,726 with a fee value of \$683,614, a substantial increase over last year, when the figures were 175,512 and \$544,402. More than 190 papers were published in the regular series of the Bureau and about 240 in outside journals, including those of the A. S. S. T.

J. F. KELLER ENDING HIS SECOND SERIES

About 650 Enrolled in Course From Cities Around Chicago

The second group of lectures which Professor John F. Keller is presenting under the joint auspices of the American Society for Steel Treating and Purdue University is almost at an end. About 650 men enrolled for the series of six lectures given concurrently at Chicago, Harvey, Milwaukee, the Twin Cities and Rockford.

Prof. Keller's first group of this season was presented in the cities of Canton, Cleveland, Erie, Lorain and Mansfield. No definite announcement has been made as yet concerning the next lecture groups. This is the first time that Prof. Keller has been able to devote an entire year to his lecture activities for the Society, and it is expected that before next summer he will have covered the eastern half of the United States quite thoroughly.

The course includes six lectures whose subjects are as follows:

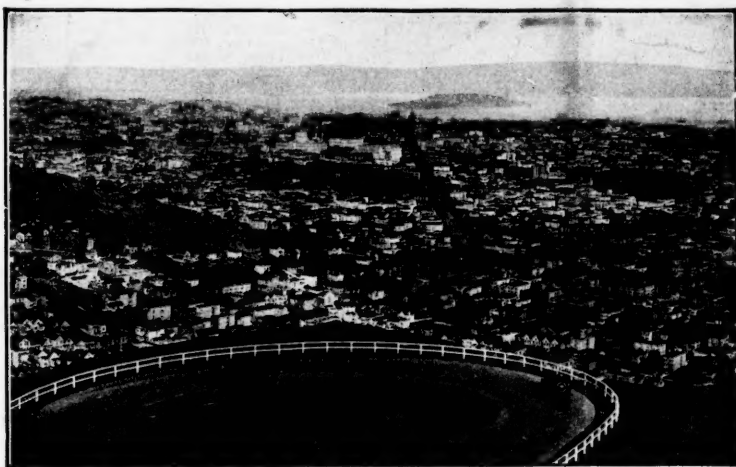
Lecture No. 1. The manufacture of iron and steel from the crude method of rule of thumb to the present highly efficient method of procedure control.

Lecture No. 2. A practical demonstration of the "Spark Method" of selecting iron and steel on a live emery wheel. The basic principles of forging and the effect of heat and work upon crystalline structure.

Lecture No. 3. Annealing, its purpose and importance in mass production of today. The refining of the crystalline structure to develop the physical characteristics. The importance of annealing iron and low-carbon welded

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A View of San Francisco



San Francisco, where the National Western Metal Congress and the National Western Metal and Machinery Exposition will be held, is a thriving city. This view shows the business section as it lies along Market Street. The A. S. S. T. will meet here Feb. 16-21, 1931.

NEW MEMBER BLANKS IN USE

Old Style Forms Should Be Destroyed, Assistant Secretary Advises

New application blanks have been prepared and distributed to the various chapters for use from now on in signing up new members of the Society. The chief changes in the new blanks are provisions for ascertaining the training and experience of new members and, second, a form to be filled by the chapter officers stating that the applicant has been accepted by the chapter's membership committee.

These changes are in accordance with the constitution of the American Society for Steel Treating.

"The old style blanks should all be destroyed," H. Kenneth Briggs, assistant secretary of the Society has advised.

"Much confusion will be avoided if the officers and the members of the executive and membership committees of the various chapters will use only the new style application blanks from now on."

HOMERBERG WITH NITRALLOY

Nitralloy Corp. Appoints Nitriding Expert as Technical Director

Dr. V. O. Homerberg, associate professor of physical metallurgy at Massachusetts Institute of Technology, has been named technical director of the Nitralloy Corp., New York. Dr. Homerberg's appointment was announced effective November 1.

The American Society for Steel Treating knows Dr. Homerberg well as chairman of the publication committee, member of the Boston chapter and frequent contributor of technical papers at the Society's annual conventions and at meetings of the individual chapters. Most of his recent papers have dealt with nitriding.

MANY MEMBERS RESERVING

"METAL PROGRESS" BINDERS

Cost Low if 500 Are Ordered

Many reservations for attractive binders for *Metal Progress* described in the last REVIEW have been received but the number has not yet reached the 500-mark which will permit the sale of the binders for the very low price of \$2.00 each.

Several enthusiastic comments have been made about the binders and quite a few members have ordered two or more, to be imprinted with their own names.

Each binder will be large enough to hold six copies of *Metal Progress* and thus protect them from ordinary wear. A simple metal device holds the copies in place without damaging them in any way.

The binders are made of a stiff, leather grained material the color of silver. The words *Metal Progress* are embossed on the front and back. The owner's name can be also embossed at a slight extra cost.

A photograph of one of the binders is printed elsewhere in this paper, as is a coupon for making a reservation. This coupon is not an order blank, for no orders will be taken until at least 500 binders are reserved, since only by ordering this number can the low price of \$2.00 each be obtained from the manufacturers.

LINCOLN ELECTRIC RAISES STEWART

The Lincoln Electric Co., Cleveland, announces the appointment of W. S. Stewart as district manager in charge of the Cleveland territory. Mr. Stewart, who was formerly in charge of the company's Pacific Coast office, will have offices at the Lincoln factory, Coit Rd. and Kirby Ave., Cleveland.

METAL PROGRESS DESCRIBES NEW CLEVELAND BUILDING

Cleveland's new Union Terminal Group of buildings is described in a way that will interest all metal men in the January issue of *Metal Progress*. John W. Love, a prominent writer on business subjects, has prepared an article on the terminal buildings which will feature the metal and other materials incorporated into the largest building between New York and Chicago.

It seems that stainless steels are coming into prominence as materials for heavy machinery such as is found in paper mills and hydro-electric plants. A prominent engineer, writing from the standpoint of a designing and mechanical engineer, has described these applications of stainless steel, pointing out for *Metal Progress* how such metal affects various design and construction factors.

The manufacture of alloy steels, as seen by an open-hearth man, is another good *Metal Progress* story. The O. H. superintendent of a large mill is the author. Non-ferrous metals enter the picture in a story describing the bronze melting equipment of an eastern plant in which a small, high frequency induction furnace melts enough bronze to keep 50 molders busy.

Informative articles on heat treating

are ever popular with *Metal Progress* readers, so the editor has scheduled two for the January number. One is a discussion of the use of city gas for carburizing automobile parts, and the other is a description of the heat treating facilities of the Brown and Sharpe plant at Providence, where thousands of fine machinists' tools are made.

A comparison of the steels used in modern airplane engines with those used during the last years of the War is the subject of an article by the editor. The recent progress in making and using steels becomes apparent in this article.

The concluding part of the outline of welding, which started in the December issue, will be printed in *Metal Progress* for January. This outline has had an enthusiastic reception, as has the discussion of pickling which began in last month's issue. The second part of the pickling series will also be a feature of the first issue of the New Year.

Letters from several correspondents both in America and abroad will appear, and several pages of up-to-the-minute editorials.

Metal Progress will be distributed about January 1, 1931.

TECHNICAL PROGRAM FOR WESTERN METAL CONGRESS WILL COVER VERY BROAD FIELD

Ten Sessions Are Rounding into Shape with Various Cooperating Organizations as Meeting Sponsors

First announcement of the technical program for the forthcoming National Western Metal Congress has been made by Howard S. Taylor, Stanford University, who is chairman of the Golden Gate chapter committee appointed to arrange the Congress program. The Congress will be held during the week of Feb. 16, 1931, in the Civic Auditorium of San Francisco, which will also be the home of a great exhibition of metal products and equipment during the week.

A total of ten separate technical sessions is being arranged for the Congress, two a day for five days. As was announced in a previous issue of the REVIEW, several western technical societies and the western sections of a number of national technical organizations are co-operating in the Congress and will sponsor various sessions.

The Society of Automotive Engineers and the American Welding Society are tentatively scheduled to sponsor two sessions each. The Society of Automotive Engineers plans to have one session on steels, and the other on non-ferrous metals. The Welding Society's program will include papers on both gas and electric welding.

The problems of corrosion will feature the session of the American Chemical Society. The papers already scheduled for this session include a review of the fight against corrosion waged in 1930, a study of the corrosion and lubrication of valves and a discussion of chromium and chrome-nickel steels.

Nitriding, machinability and creep of metals at high temperatures are the subjects of three of the papers which will be given at the session sponsored by the American Society of Mechanical Engineers. As is the case in every session, the papers will be presented by recognized leaders in their fields.

The Pacific Coast Gas Association session will include a description of gas furnaces used for nitriding and a general survey of the recent developments in the design and construction of gas furnaces. A third paper is a thorough-going exposition of gas carburizing.

The American Institute of Mining

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CHAPTER HEARS OF IMPACT TEST STUDY

G. H. Wright Tells Schenectady Men of Charpy Test Results

George H. Wright, of the General Electric Co., in a talk to the Schenectady chapter of the A. S. S. T. on Tuesday, Nov. 18, gave a most interesting account of an extensive study of notched impact values of large forgings, many of which had failed in service.

The erratic behavior of materials, both alloy and plain carbon, under the Charpy impact test, emphasizes the need for further study of the already much discussed property. Standard and double width specimens were studied and it was found that in practically every case of shaft failure not only was the standard impact specimen very low but the double width specimen showed equal or lower values than the single, instead of twice the value, as would be normally expected.

Data submitted showed that specimens quenched from the draw were usually higher than those slowly cooled and that, by a third heat treatment at a lower temperature for stress removal, the impact value could usually be still further increased. This temperature varied with different types of steels but usually had to be kept under 450°C-500°C, followed by slow cooling.

The differences found apply only to notched bars. Unnotched impact does not develop these wide differences. Acid and basic steels have been studied as well as the effect of impurities. Although data are not complete, high phosphorous seems to have a marked effect in lowering impact values. Fa-

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TOTAL A. S. S. T. MEMBERSHIP NOW WELL OVER 6200 MARK

November Sees 63 Net Increase

Continuing its upward trend, the membership in the A.S.S.T. increased from 6188 to 6251 during the month of December, a jump of 63 members, net.

In Group 1, Philadelphia wrested fifth place from New York. In Group 3, Tri-City climbed into third ahead of Worcester for the only other change in chapter standing. On Dec. 1 the chapters and totals were:

1.	Chicago	547
	Pittsburgh	481
	Detroit	474
	Cleveland	395
	Philadelphia	357
	New York	356
	Boston	276
2.	New Jersey	277
	Los Angeles	250
	Golden Gate	168
	Hartford	159
	Milwaukee	152
	Lehigh Valley	137
	Buffalo	120
	Montreal	115
	Cincinnati	114
	Canton-Mass.	102
	St. Louis	101
	Dayton	80
	Syracuse	78
	Indianapolis	78
	North-West	65
3.	Ontario	140
	New Haven	115
	Tri-City	103
	Worcester	95
	Washington	91
	Schenectady	83
	Rochester	76
	Rhode Island	71
	York	70
	Columbus	61
	Rockford	57
	Southern Tier	49
	Springfield	48
	Notre Dame	36
	Fort Wayne	21

FRENCH DISCUSSES QUENCHING STEELS

Describes Coolants, Hardness Variations to Ontario Men

By John W. McBean

About one hundred were present at the Royal Connaught Hotel in Hamilton, Ont., on November fourteenth to hear about the "Quenching of Steels" by H. J. French of the Research Laboratories of the International Nickel Co. The occasion was a meeting of the Ontario chapter.

Mr. French took up some of the factors which determine the selection of coolants, such as the kind of steel, the size, the properties desired and illustrated his talk with a considerable number of slides and tables.

These showed especially the effects of sodium hydrate solutions and common salt solutions, water as bath and spray and oils at various temperatures and the effect of the manner of application of the coolant.

The slides also showed the large variations in speed both at the surface and the centre of specimens with the application of the various coolants and various temperatures of coolants. The maximum cooling rates as estimated by tangents to the curves were shown to be very high in many cases and therefore slight variations of conditions would affect the results. There were also shown the critical cooling rates which must be exceeded to produce fully hardened steel and the effects produced by slower cooling from the critical.

One of the interesting points brought out by the slides was the variations in the hardness of the surface between the "front" and "back" of a specimen

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THE REVIEW

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A Review of the Activities of the Chapters and National Organization of the A. S. S. T.

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JOHN G. MAPES Managing Editor

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WE WISH YOU ALL GOOD LUCK

Christmas is still several weeks away, and New Year's even further. Nevertheless, THE REVIEW staff has to wish you all the best of luck in this issue, or else be too late as far as the calendar is concerned. So here are our heartiest wishes for a pleasant holiday season and for a most happy and prosperous year.

TRANSACTIONS

The bound *Transactions*, Vol. 18, will be delivered to all who have ordered them, about January 1st, 1931. The volume contains all papers that were presented at the National Metal Congress, as well as the editorial matter contained in the July and August, 1930, issues of the former monthly, *Transactions*, and several other contributions. Bound in an attractive blue, the book will match the bindings used for years by the Society to bind volumes that the members returned to the National Office. The prepublication price of \$2.50 represents a considerable saving over the former cost of \$4.00 for binding the year's editorial output of the former monthly publication.

This new service represents a distinct advance in the service of the Society. As in the past, practically all the papers are available in preprint form to those who request them. By reprinting the technical papers all at one time, they are now available to the membership just a few months after the annual convention. In the past, convention papers composed the bulk of editorial material which was published throughout a period of nearly twelve months.

The activities of the Society are well rounded with *Metal Progress* as the monthly publication which replaces the former monthly *Transactions* and gives current information in concise form. The more technical papers are made available in preprint form just as soon as they are accepted by the Publication Committee. Notice of new preprints will be published in the REVIEW as they appear. Members desiring this material in more permanent form for library use are better served by the new *Transactions*, which are available almost immediately after the annual convention.

CONGRATULATIONS, OXY-ACETYLENE TIPS

One hundred issues of *Oxy-Acetylene Tips*, the organ of the Linde Air Products Co., have now been published. The magazine originally was planned as a house organ for the company's sales and service staffs, but soon grew into a publication for the presentation of oxy-acetylene process facts to those whom such facts would benefit. *Oxy-Acetylene Tips* stands high among industry's educational publications and it is hoped that many more hundred-issue milestones will be passed.

RANDOM NOTES ON THE WESTERN SHOW

From advance reports the events of the National Western Metal Congress and Exposition promise to be good. They will be good, if the ability and enthusiasm of the men who are planning things count for anything. Nothing is being neglected that might add value to the exposition or to the technical programs.

We understand that the well-known western progressiveness is very much in evidence. Comparatively few firms, when solicited for exhibition space, have replied "We are sorry, but business is so bad that we can't afford to exhibit." They must realize that such a reply means little else than "We're sorry, but business is so bad that we can't afford to try to get new business." There may well be a number of excellent reasons why a firm cannot or should not show in an exposition, but seldom, if ever, should the "can't afford it" reason be rated as excellent.

The exposition is going to be large, but more than that, it is going to be interesting in both scope and details. West Coast people are looking forward to it as the great educational event of 1931, and those in the middle west and east should be hardly less enthusiastic.

The technical program for the San Francisco meeting is shaping up well. A number of nationally known men have already consented to speak and several others are listed tentatively. The subjects to be covered are quite as varied and interesting as those on any previous Congress program.

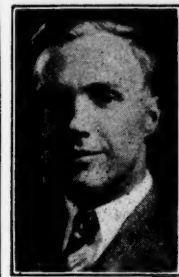
All in all, the very writing of these "random notes" has sold us on the desirability of being in San Francisco on February 16, the opening day of the Congress and Exposition. California is far away, but it will be attractive to metal men in February.

R. S. ARCHER JOINS A. O. SMITH AS HEAD OF METAL RESEARCH

Is Active in A. S. S. T. Affairs

Robert S. Archer, since 1920 metallurgist in the research department of the Aluminum Company of America, Cleveland, has resigned to become head of the metallurgical research staff of the A. O. Smith Corp., Milwaukee. He assumed his new duties on December 1.

Mr. Archer has long been active in the affairs of the Cleveland chapter of the Society and has played an important part in American Society for Steel Treating national affairs. He is a member of the Recommended Practice Committee and has appeared as a speaker before many of the chapters and on several programs of the annual National Metal Congress.



In 1916 Mr. Archer received the degree of Bachelor of Chemical Engineering from the University of Michigan, and the following year was awarded the degree of Master of Science. He then became affiliated with the research department of the Aluminum Castings Co., where he remained until joining the research staff of the Aluminum Co. His work has been concerned chiefly with the development and application of alloys and metallurgical processes.

At the A. O. Smith Corp., Mr. Archer will be in charge of the company's metallurgical research and will direct the activities of 100 men. The entire research and development staff of the company will be housed in a magnificent new building, soon to be completed.

YORK GROUP LIKES NITRIDING

TALK BY JOHN H. HIGGINS

Nov. 14 Meeting Attracts 90

By A. W. F. Green

John H. Higgins, materials engineer, Camden Forge Co., Camden, N. J., Nitriding! A good talker, a good topic, a good discussion. Just plain reactions of the York group at its meeting held in York, on November 14, in conjunction with the Engineering Society of York.

The York Group had a turn out of ninety individuals present at that meeting, representing not only the many metal making and consuming industries of York, but there were present fine delegations from Harrisburg and Lancaster.

Mr. Higgins' paper was presented in conjunction with lantern slides and embraced the commercial application of the process, especially to large forgings. The particular points stressed by Mr. Higgins were: The nature and application of the process; the selection of material suitable for use in the process; the preparation of material before subjecting it to the action of nitriding; the effects and defects encountered in nitriding; the actual service records of many large and small applications and, finally, the unbounded future for the proper use of nitrided steels.

Particularly interesting was his discussion of corrosion. He also explained the loss of hardness of nitrided cases as temperatures in excess of nitriding temperatures are exceeded, and gave actual results of nitriding S. A. E. chromium-vanadium steels of the 6100 group, and also low carbon steels, such as 1120, etc.

The interest aroused by Mr. Higgins' talk is best attested to by the tremendously illuminating and pointed discussion which followed his presentation and which lasted for more than one hour.

ALLOYS SOUTH. TIER TOPIC

W. G. Hildorf Tells Chapter Ultimate Use Should Influence Choice

By W. S. Bennett

The meeting of the Southern Tier chapter of the American Society for Steel Treating was held at Hotel Fredericks at Endicott, N. Y., Monday evening, Nov. 17.

Walter G. Hildorf, of the Timken Steel & Tube Co., Canton, Ohio, was the principal speaker. He delivered a very interesting talk on alloy steel, dealing with its manufacture and use. Among other things he pointed out that the value of steel or of certain heat treating processes for steel, depended upon the class of service in which it was to be put, and that very often steels which do not show particularly good results with some of the standard tests proved to be the best available for specific types of work.

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HEAT TREATMENT OF SPLINE SHAFTS
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COLD HEADING, ROLL THREADING AND HEAT TREATMENT OF BOLTS

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PLASTIC DEFORMATION IN PURE IRON
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HEAT TREATMENT OF CARBON STEEL GEARS
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HEAT TREATMENT OF HELICAL SPRINGS
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MELTING OF STEEL
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HOT MECHANICAL WORKING OF STEEL
S. C. SPALDING, Chairman, American Brass Co., Waterbury, Conn.; J. P. Fleming, R. M. Bird, W. R. Shimer.

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Sub-Committee XIV on Tool Steels of Comm. A-1, A. S. T. M.—J. P. Gill.
American Society of Mechanical Engineers, Special Research Committee on the Cutting and Forming of Metals—H. J. French, W. Paul Eddy.

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Committee A-3, A. S. T. M. on Cast Iron—Hyman Bornstein.
American Society of Mechanical Engineers, Engineering Index—F. F. Lucas.

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SHIP YARD VISIT FEATURES

NOVEMBER BOSTON MEETING

Upset Forging Talk Presented

By H. E. Handy

One hundred and fifty members and guests of the Boston chapter, together with about forty members of the New England Gas Association, visited the Fore River plant of the Bethlehem Shipbuilding Corp., Ltd., at Quincy, Mass., Nov. 7. The party went aboard several partially completed ships, among them a 6100-ton tanker and a 7057-ton passenger vessel. The tanker was equipped with a Sperry gyrocompass pilot and an R. C. A. radio compass, both of which were of interest.

Through the courtesy of Mr. Harry E. Gould, general manager of the Fore River Yard, dinner was served in the company's new dining room. The technical session found Dr. G. B. Waterhouse, chairman presiding. The guest speaker was J. H. Friedman, National Machinery Co., Tiffin, Ohio, whose subject was "Upset Forging". Mr. Friedman showed three reels of motion pictures illustrating the manufacture of many types of forgings with National forging machines. The speaker had with him a large number of machine-made forgings which he described.

PHILA. MEN STAGE

NITRIDING MEETING

J. H. Higgins Is Main Speaker; N. L. Mochel Leads Discussion

By A. O. Schaefer

The second regular meeting of the 1930-1931 season of the Philadelphia chapter, American Society for Steel Treating, was held on Friday, Oct. 24, at the Engineers' Club. The dinner preceding the meeting was attended by 65 members and guests.

William Thatcher, personal secretary to Mayor Harry A. Mackey, delivered the coffee talk. His enthusiasm for the future of Philadelphia was contagious and aroused much of the dormant civic pride within us. Mr. Thatcher dwelt particularly on the inauguration on November 22nd of the new Grace Line Service between this port and Peru.

Mr. J. H. Higgins of the Camden Forge Company delivered the address of the evening on "Nitriding". A brief resume of his remarks follows.

The selection of the proper steel for nitriding is important. The alloys used have a tendency to retain dirt, etc., particularly in the larger sizes. However, they all forge readily, the usual temperature range being between 2150 and 2250° F. Such alloys do scale more heavily than ordinary steels. No difficulties have been encountered with their machinability, although a high sulphur content of about .14% helps in this respect.

Superior physical properties are usually found when the steels have a quenched and tempered sorbitic structure. Forgings or castings should be well normalized to minimize warpage during nitriding. The proper equipment for nitriding depends on the type and amount of work being performed. For large work containers about .17% carbon, have been used and give 700 to 1600 hours' service. At Camden Forge Co., the large box is now enamelled. Enamelling worn-out carbon steel containers has not been successful.

The test of the case for ductility is very difficult. It was formerly thought that the Vickers hardness testing machine gave an indication of the condition of the metal in this respect. If there were spalling of the surface adjacent to the indentation from this test, the case was said to lack ductility. It is now known that a slight tool mark in the surface will also cause this. A test piece of the same melt, ½" in diameter by 8" long, can be nitrided in the same charge with the material to be tested. Such a piece can be bent, and the extent of the distortion necessary to produce cracks in the surface will give an indication of the ductility.

Toughness can be imparted to the case by nitriding in a double cycle, that is, at 950° F. for the usual time, then at 1150° F. for about two hours. Some prefer to reverse the cycle and give the high heat first. This process toughens the case, but lowers the hardness about 100 points Brinell.

Years of study are, perhaps, necessary to perfect the art of welding nitrided parts. Spot welding can be done, but butt welds are not so successful. The loss of 50% of the aluminum content of the metal adjacent to the weld leaves the job non-uniform.

In conclusion, Mr. Higgins stated that the use of the process was limited only by the boldness of the designer and the vividness of his imagination.

Mr. Mochel led the discussion following the paper. He had previously asked several members of the chapter to prepare written discussions on the phases of nitriding with which they were most familiar.

Mr. Harsch spoke of the investigations made at the Leeds and Northrup Co., on materials for furnace parts. He enlarged on the tests with silica, monel metal, 80-20 nickel chrome, 18-8 chrome nickel steel, and 20% nickel, 15% chrome. Long time tests were run, using tubes of these materials as containers with regular charges. It was found that a high nickel content prevents dissociation of the ammonia and is, therefore, desirable. The formation of the nitride in Monel metal does not catalyze the dissociation. A low manganese content in the monel is advised.

Mr. Casner spoke of the development of the type of nitriding furnace used by the Westinghouse Electric and Manufacturing Co. This is a bell type furnace in which all gas connections are permanent. The charge is cooled in the nitriding box, while the bell top is placed over another charge on another base for heating.

In the open discussion which followed, Mr. Trembly stated that he had found decarburization to be produced on clean surfaces when first heated to be due to the dissociation of the ammonia. This can be prevented by taking care that only pure ammonia, not dissociated, comes in contact with the charge at first.

GREAT SPRING SECTIONAL MEETING OF THE SIX NEW ENGLAND CHAPTERS NOW ASSURED

April 14 is Date Set for 2 Morning Technical Sessions, Afternoon Plant Visits and Evening Banquet

A spring sectional meeting of the New England chapters of Boston, Providence, Worcester, Springfield, Hartford, and New Haven, to be held at Hartford on April 14, has been definitely assured by the acceptance of all the chapters and arrangements are under way to make this event well worth the time and effort of all who attend. Preparations are being made to entertain more than 500 members and their friends.

A full day program has been scheduled. There will be two technical sessions in the morning, several plant visitations in the afternoon, and dinner, entertainment and an address in the evening.

The committee has been successful in securing for the technical sessions Dr. V. O. Homerberg, professor of physical metallurgy at the Massachusetts Institute of Technology, and E. W. Page of the General Electric X-Ray Corp., of Chicago.

Dr. Homerberg will give a resume of the developments in nitriding which will include a digest of the experimental and practical achievements in this new and increasingly important method of hardening. Mr. Page, whose subject will be "X-Ray as it Applies to Industry", will bring news of the latest developments of the X-Ray in metallurgy. Such rapid strides are being made in the practical use of the X-Ray for examination of metal structure and non-destructive testing that this will be a timely treatment of the subject.

In the afternoon, inspection trips will be conducted in several of Hartford's leading industrial plants. Arrangements are being made to divide the parties into small groups which will be conducted by competent guides. It is hoped that the new, modernly equipped plant of Pratt & Whitney Aircraft Corp., manufacturers of the famous "Wasp" and "Hornet" airplane motors, will be included in the list of plants visited.

A dinner will be held at the Hotel Bond and a lively entertainment to accompany the dinner course is promised. The speaker of the evening will be Dr. Zay Jeffries, past president of the society, whose address will be on the subject, "The Metallurgist in Industry". Several of the national officers of the society are expected as guests.

Every effort will be made to conclude the meeting by 9:30 P. M. to give the out-of-town members an opportunity to get home that night.

AIRCRAFT ENGINE MATERIALS TOPIC

R. R. Moore Tells Springfield of the Various Metals Used

By T. P. Jones

The first meeting of the Springfield chapter's season was held Monday evening, Oct. 20th, in the auditorium of the Junior Achievement Foundation on Pearl Street. It was preceded by a dinner at the Hotel Kimball.

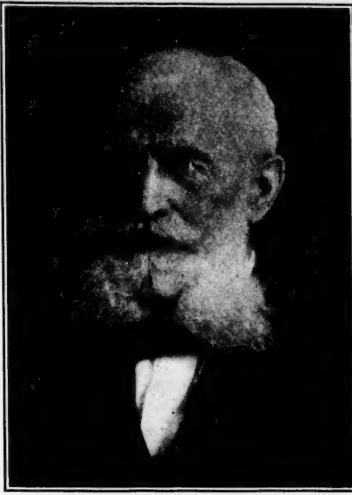
R. R. Moore, metallurgist of the Wright Aeronautical Corp., Paterson, N. J. was the speaker of the evening and had for his subject, "Materials used in Aircraft Engine Construction."

The meeting was well attended as this subject is able to interest a very wide group not only because of the popularity and attention that is being given to aircraft work today, but also because the complete and diverse material used in construction would interest anyone engaged in metal industries.

For example, aluminum alloys represent about 43% of the weight of air-cooled radial type engines. Aluminum is rarely used except in alloys containing various amounts of silicon, copper, magnesium and other metals, in such parts as cylinder heads, crank case castings and pistons. The alloying element depends, of course, on the properties required for the service intended. Many die castings are also used in aeroplane construction for unstressed standardized parts.

Fatigue resistance is exceptionally important in all classes of alloys used. Mr. Moore gave typical analyses of various types of steels used for bolts, crank shafts, connecting rods and forgings, where high strength and fatigue resistance are desired. He described how carefully finished parts are inspected, to avoid any parts being placed in service with even fine tool marks being present which might engender localized stresses which would be apt to cause failure.

Dr. Richard Moldenke



DR. MOLDENKE, OF FOUNDRY FAME, ENDS GREAT CAREER

Was Member of the A. S. S. T.

Dr. Richard Moldenke, long a leader among foundry metallurgists, died Nov. 17, at Plainfield, N. J., after a brief illness. Dr. Moldenke was active in the American Foundrymen's Association since its establishment and served that society as secretary for 14 years. He was also an interested member of the New York chapter of the American Society for Steel Treating.

Dr. Moldenke was a prolific writer on foundry and metallurgical subjects, his work ranging from the basic textbook, *Principles of Iron Founding*, to many articles, pamphlets and treatises on commodities used in foundry practice, on methods and special alloys. He was an honorary member of the American Foundrymen's association, the Institute of British Foundrymen, the Pittsburgh, New England and Newark Foundrymen's associations.

He served as vice president of the American Society for Testing Materials and held active membership in the A. S. S. T., the American Institute of Mining Engineers, the American Society of Mechanical Engineers, the American Electrochemical Society, the British Iron and Steel Institute and the German Verein Deutscher Eisenhüttenleute. In 1925, Dr. Moldenke was awarded the Joseph Seaman medal by the American Foundrymen's association, in recognition of his many contributions and his service to the foundry industry.

CHARPY TEST TALK

Continued from Page One

tigue tests on notched and standard specimens appear to follow the impact values.

The importance of this test for modern high stress application is emphasized by the fact that in all cases, with the Charpy value varying from 8 to 50, static tensile properties showed excellent strength and ductility and so gave no hint of low shock resistance, which awaited only the proper stress concentration at key-way or shoulder to cause untold damage.

Mr. W. E. Ruder in discussion offered an explanation for this notch impact weakness which appeared to cover most of the facts brought out.

Any satisfactory explanation, he said, must be one involving composition, for in that way alone could the intragranular weakness to shock be accounted for. The phenomena described by Mr. Wright had, in his opinion, an exact counterpart in the brittleness induced by nitrogen in the case of high N steels, such as Bessemer steels, and in the action of carbon in producing extreme brittleness in silicon steel, under certain conditions of low temperature annealing.

The effect of small amounts of intermetallic compounds, generally known to be strong but very brittle, has been overlooked by metallurgists generally. At the low temperature of drawing or stress removal, steel is too rigid in structure to allow of much diffusion, so that compounds falling out of solution can get no further than the crystal planes where they deposit and form planes of weakness to shock, provided sufficient material is present to form a more or less continuous film. These films, being strong, maintain static tests but being brittle readily fail under shock.

High phosphorous may, therefore, as Mr. Wright's experiments suggest, be the important factor, but under different conditions other compounds would do the same thing. Importance of this low temperature precipitation of compounds has been underestimated, largely owing to our lack of fundamental data on the precipitation and solution temperature of such compounds, in different media. The phenomena is only another phase of age hardening.

J. R. ADAMS TELLS OF BIG FORGINGS

Washington - Baltimore Members Hear His Outline of the Art

By Leo J. Waldron

The second meeting of the Washington-Baltimore chapter was held at Baltimore on Nov. 20. Both the dinner and following technical session were held at the Engineers' Club. About 75 members and guests were privileged to hear J. R. Adams, superintendent of the Special Products Department of the Midvale Company, address them on the subject of "Forgings".

Mr. Adams' talk was almost totally confined to large commercial forgings produced under the hammer or press; the theoretical considerations involved together with specific illustrations (laminar slides) of the various steps being shown.

The production of finished shapes by either the hammer or press requires, (1) consolidation of the metal, (2) extrusion of the slag, (3) alterations to the structure, and (4) improvements to the physical properties. It is very important in hammering to consider the elastic effects produced by a blow inasmuch as the central portion is not so effectively altered as the outer portion, whereas with the press the centers are worked more. Hammer forging requires the choice of either V-eyed, half-round, or flat dies; flat dies should never be used for round work since they cause a weaving on the center which will weaken and sometimes burst the forging. V-eyed dies should be used whenever possible as the tendency toward working of the surfaces is decreased. Hammering is excellent for producing small parts for severe service and disadvantageous in the production of large pieces where the centers are imperfectly worked.

The ingot design must be carefully worked out, particularly with special alloy steels—incorrect design producing unsound metal full of secondary shrinkage cavities. A design may be correct for one metal and incorrect for metal of another composition.

The ingot material should be given an even heating in the proper forging furnace at not too rapid a rate to cause fire cracking, soaked at the desired temperature for sufficient time so that the centers are at the same temperature as the outside, and then worked, finishing at a temperature as low as practical.

He considered the different types of metals and shapes forged successfully, especially the large hollow forgings made on mandrels. The various operations encountered in their production were of particular interest, i. e., making of closed ends on large cylinders such as retorts and stills, the use of special dies in producing bolster forgings of irregular shape and composed of widely varying diameters but worked from regular shaped ingots, production of round and flat work, the use of piercing, V-tool, and trephining tools during pressing and their resultant effect upon the work, and different die operations producing either tangential or longitudinal flow.

A lively discussion followed Mr. Adams' presentation. The whole lecture was of a very popular nature and appealed to the engineer, metallurgist and layman.

HEAT AND RUST RESISTING STEELS TRI-CITY SUBJECT

John S. Ewing's Talk Applauded

The properties and uses of corrosion and heat resisting steels were described by John S. Ewing, metallurgist, Crucible Steel Co. of America, at the November meeting of the Tri-City chapter of American Society for Steel Treating held at the Le Claire Hotel, Moline. Over one hundred were in attendance.

Chemical analyses of the various steels and their use as classes were briefly given. The steels are principally low carbon chrome-nickel and chrome-nickel-silicon alloy steels.

The corrosion and heat resisting steels are being used more and more by an increasingly large number of industries. A few of the present day uses of the corrosion resisting steels are in household utensils, sinks, etc., milk handling equipment, sugar refining apparatus, oil refining machinery, acid handling equipment, automobile engine and Diesel engine valves, automobile trimming, building trimming and fixtures and refrigeration apparatus.

Means have been worked out to roll, draw, bend, stamp and weld corrosion resisting steels and certain types machine easily. A very recent development has been a stainless steel that retains a cutting edge that can be used in cutlery.

"18-8" TALK WINS FAVOR AT BUFFALO'S LARGEST MEETING

Over 120 Hear C. A. Scharschau

By Charles F. Wahl

The Buffalo chapter held its third regular meeting on Thursday evening, Nov. 20, at Hotel Buffalo, with fifty-two present at the dinner and about one hundred and twenty members and guests for the meeting.

In the absence of Chairman H. J. Cutler and Vice-Chairman J. H. Birdsong, J. Robert Eves, treasurer, called the meeting to order and after a few remarks, introduced the speaker of the evening, Charles A. Scharschau, director of research for the Allegheny Steel Corp. of Brackenridge, Pa., who presented a paper, "Corrosion Resisting Ferrous Alloys". The 18 per cent chrome and 8 per cent nickel alloy was briefly described with the aid of charts and slides. The above alloy is usually melted in the electric furnace, and is quite difficult to produce satisfactorily.

The austenitic chromium-nickel alloys of the "18 and 8" composition are produced in strip and sheet form and in bars. To obtain the austenitic condition, heat to 2100 degrees Fahr., and cool rapidly. This steel compares in hardness to mild steel with about 140 Brinell. By severe cold-working, approximately 400 Brinell is obtained. The steel is practically non-magnetic.

Fatigue is about one-half of the strength. The "18-8" alloy is one of the greatest achievements of the metallurgist and nearly approaches that of the noble metals in resistance to corrosion.

The attendance was the largest the Buffalo chapter has ever enjoyed.

220 GOLD GATE MEN SEE STANFORD LABS

President Hoover's Brother, Engineering Dean, Present

By R. S. Hirst

Football and sports may have their place in the life of a school or university, but all sports had to take a back seat on the visit of Golden Gate chapter to Stanford, Monday, Nov. 17.

Dinner was served in Stenford Union, and at 6:25 p. m. we entered the dining-room and when we were all seated we found we had a dinner party of 220. You know what kind of a time A. S. S. T. members and guests have at dinner, and this was no exception to the rule.

Palo Alto is the home of our president, Mr. Hoover, and, also, the home of some of his family. Seated at the head table were the following: Theodore J. Hoover, brother of our President, dean of the School of Engineering, and executive head, Department of Mining Engineering, Stanford University, who welcomed the members and guests of Golden Gate chapter and outlined the organization of Engineering School.

Ivan L. Johnson, chairman of Golden Gate chapter, A. S. S. T., then introduced the speakers, Arthur B. Domoski, head of the department of mechanical engineering at Stanford; W. H. Eisenman, national secretary, A. S. S. T.; R. L. Loufborow, graduate student of mining engineering; Myron Bird, vice chairman of the chapter, and R. S. Hirst, chapter secretary.

About 275 men then inspected the following laboratories and equipment which were under working conditions, and as far as possible students were operating each piece of equipment and were available to answer questions:

Mechanical Engineering Laboratory: steam engines, boilers, etc.

Materials Laboratory: Testing equipment, two new testing machines have been installed lately, besides older equipment.

Ordnance Laboratory and Gauge Laboratory: Ordnance equipment, including tractors, guns up to 6-inch howitzers, anti-aircraft material, machine tools, etc. The new gauge laboratory was open, with \$50,000 worth of gauging equipment on display. Ordnance cadets in uniform were stationed at each piece of ordnance equipment to explain its use. A gauge expert was in attendance in gauge laboratory.

Aeronautics Laboratory: The Guggenheim Laboratory was in full operation for demonstration purposes.

Mechanical Engineering Shops: The machine shop, foundry and heat treatment shops were in operation, as well as the various types of welding equipment. Heat treating furnaces, forge furnaces, steam hammer, electric steel furnace centrifugal casting, etc.

Mining Engineering Laboratories: High explosives laboratory, steel analysis, experimental heat treatment, high frequency furnace. Pyrometric calibration laboratory, metallographic laboratory, petroleum engineering laboratory, fuel testing laboratory.

MAGNESIUM ALLOYS INTEREST DETROIT

Dr. Gann Tells Manufacture,
Character of Light Metal

By O. W. McMullan

The second meeting of the Detroit Chapter was held Monday evening, November 10th, in the Fort Shelby Hotel. A dinner was followed by a very interesting talk on the humorous side of broadcasting by Leo Fitzpatrick, manager of station WJR.

The main talk of the evening was on "Light Metals in Industry" by Dr. John A. Gann of the Dow Chemical Co. Dr. Gann classified light metals as being those below 3.8 specific gravity. Of these only two, aluminum and magnesium, are of commercial importance in alloys. The talk was restricted to magnesium alloys except by way of comparison with more common aluminum alloys.

The production of magnesium in 1929 was 1,000,000 pounds and of aluminum, 225,000,000 pounds. Magnesium chloride, the source of the magnesium, is separated by crystallization from a brine containing magnesium, sodium and calcium chlorides. The magnesium is separated electrically and may be remelted any number of times without injury with a flux of $MgCl_2$ and $NaCl$.

Magnesium will alloy with most of the common metals but best with aluminum. Manganese from .2 to .4% is added to decrease corrosion and increases the yield point by 5,000 to 10,000 pounds per square inch. Magnesium dissolves 11.5% aluminum at about 850° F. and 7% at room temperature.

The alloys are used as cast or after solution and precipitation treatments. Treatments will raise the strength from 26,000 pounds per square inch to 38,000 pounds per square inch. The best casting composition has 6-8% aluminum and .3 to .4% manganese. This alloy contains enough magnesium-aluminum compound to give strength without brittleness. Alloys may be extruded for which a temperature of about 750° F. is used. They may also be cold worked and recrystallized by heating. For equal weights the cast alloys will show a strength of 145,000 pounds and the wrought 175,000 pounds as compared to 60,000 pounds for mild steel. Stiffness may be as much as eighteen times that of the same weight of steel.

The cost of cast magnesium is about \$.52 per pound and the weight about 2/3 that of aluminum. Magnesium alloys are very easy to machine and could probably be substituted for cast iron when the machine work is equal to the cost of the casting. Shrinkage is high and large risers are required. Greater clearances are necessary because of the 10% greater coefficient of expansion than with aluminum alloys.

For etching, a 2% HNO_3 in alcohol shows coring, and 4% oxalic acid or oxalic plus malic acids (10:1) shows the magnesium-aluminum compound.

PURDUE HAS WELD MEETING

Two-Day Conference, Dec. 10-11, Will
Show Late Developments in Art

The Engineering Extension Department of Purdue University has announced its sixth annual conference on welding which will be held at Lafayette, Indiana, on December 10-11, 1930.

This two day educational conference will deal with the latest developments in application of welding as applied to manufacturing operations and maintenance problems. The conference is open to anyone interested in welding. Manufacturers are invited to exhibit and demonstrate welding equipment.

Programs and detailed information may be obtained by addressing the Engineering Extension Department, or the Department of Practical Mechanics, Purdue University, Lafayette.

SYRACUSE HEARS SHEPHERD

A. S. S. T. Director Nominee Talks Heat
Treating and Describes Europe

By Walter J. Hansen

Syracuse chapter held its second meeting of the season on Nov. 11, at the Onondaga Hotel. B. F. Shepherd, metallurgist for the Ingersoll-Rand Co., Phillipsburg, N. J. and nominee for the directorate of the Society, gave a brief talk on general heat treatment of steel.

Mr. Shepherd also projected a number of pictures on a screen which illustrated some of the experiences he had while in Europe last summer. His descriptions of the routine and procedure in effect in European steel plants proved very instructive.

DAYTON LEARNS TO CAST GOOD STEEL

Herman Walther Explains Why
Some Castings Are Not Good

By G. R. Long

The November meeting of the Dayton chapter was held Nov. 17 at the Engineers' Club. The main talk of the evening was unique in that home talent was drawn upon. Herman Walther, metallurgist at the Dayton Steel Foundry, and treasurer of the Dayton chapter, told fellow members how to make good steel castings. Mr. Walther first took up patterns, discussing how they should be designed with proper allowances for shrinkage and machining, rounding of corners, filletting, etc.

The most important single factor in steel casting work is sand. As steel is poured at from 500 to 800 degrees Fahr. higher temperature than cast iron, it is essential that it be almost pure silica and as low as possible in such constituents as alumina, lime, and iron oxide. Too high a percentage of alumina will cause the iron to burn into the sand. Sand with sharp corners tamps down more than rounded sand particles and is suitable for dry molds. Green molds are better made from rounded sand particles. Control of sand and sand conditioning by laboratory tests was stressed as being extremely important due to the close limits required.

Most of the cast steel made today is melted in the open hearth or electric furnace with the acid open hearth having the preference over basic linings. Light castings are usually made from electric furnace metal. All steel castings must be annealed to remove the large grain. Annealing should be regulated in accordance with the size of casting and the use for which it is intended.

Defects in cast steel are shrinks, cracks, internal blowholes, and surface defects. The most common defect is shrinkage. This can be controlled by such things as casting with the large end up, proper chilling, very slow solidification, and proper position of heads and gates. Cracks are due to contraction of steel after solidification which is greater the lower the carbon. Approximately at the eutectoid composition contraction reaches a minimum. High sulphur always causes red shortness. Unevenness of section, sharp corners or edges, and resistance of core and sands may put such a strain on the cooling metal that its strength is exceeded. Blowholes are due to gases in the steel, trapped air, and gas coming from the mold. Electric furnace steel is very seldom the source of "wild" steel. Trapped air is a matter of mold design. High moisture or organic content of the sand will give rise to troublesome gases. In addition sand must be permeable so that the gases which are formed in normal practice will be easily eliminated.

Following the talk Howard Leslie, furnace supervisor at the Dayton Steel Foundry Co., gave a short talk illustrated by slides on Electric Furnace Melting Practice. A most valuable part of this section of the program was the discussion.

WESTERN CONGRESS, SHOW PROGRESSING

Varied Program Being Planned

Continued from Page One

and Metallurgical Engineers is also listed to sponsor a most interesting program. High test cast iron and manganese steel are two of the topics to be covered, and how to improve the physical characteristics of large steel castings is a third. The other paper listed so far is a study of steel manufacture which deals particularly with the open hearth.

Electricity, applied to electric furnaces and industrial heating and as the driving force in a steel mill, is to feature the session which will be sponsored jointly by the American Institute of Electrical Engineers and the Pacific Coast Electrical Association. Still another session will be held under the auspices of the American Society for Testing Materials, although no definite information on this session is now available.

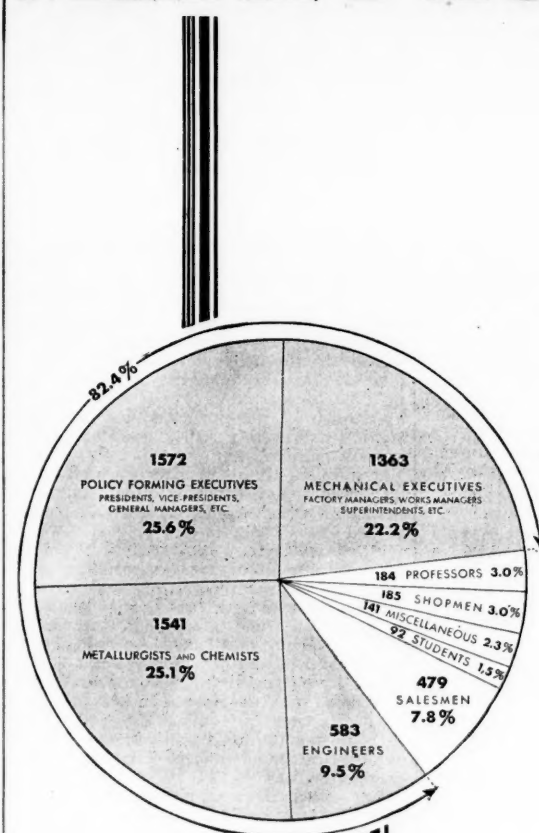
Due to interest generated in the congress and exposition, it is forecast that at least 5,000 persons will attend the former, and 60,000 the latter. Congress sessions will be held during the mornings at the St. Francis Hotel, and afternoon sessions in the auditorium, in a large convention hall adjacent the exposition floor.

Numerous committee meetings have been held, and all members of the western local committee are reported working energetically to make the show take on greater importance than the previous western event, held in Los Angeles two years ago.

SOME COMING CHAPTER EVENTS

Boston	Jan. 9—Stainless Steel Frank R. Palmer	New York	Jan. 12—Metallurgical Problems of the Electrical Manufacturing Industry T. S. Fuller
Feb. 6—Aluminum Alloys H. E. Dix, Jr.		Feb. Meeting—Probably plant visitation to the International Nickel Company's new Research Laboratory	
Mar. 6—Salt Baths Sam Tour		March Meeting—Open	
Apr. 3—Aston Process for Making Wrought Iron James Aston		April Meeting—Annual Smoker	
May 1—Recent Nitriding Developments V. O. Homerberg			
Buffalo	Dec. 18—Deep Etching H. G. Keshian	Ontario	Jan. 11—Bearing Metals O. W. Ellis
Jan. 22—Steel Castings R. A. Bull		Feb. 6—	J. P. Gill
Feb. 26—Metallography V. N. Krivobok		March 6—Steel Failures H. B. Knowlton	
Mar. 26—X-Ray R. H. Aborn		April 10—Malleable Iron Dr. H. A. Schwartz	
Apr. 23—Steel Manufacturing G. B. Waterhouse		May 8—	T. Holland Nelson
Canton-Massillon	Feb. 3—Sheet Metal G. L. Kelly	Pittsburgh	Jan.—Aluminum: Its Production F. C. Frary
Apr. 7—Corrosion C. F. Rassweiler		Feb. 6—Research and Industry N. I. Stolz	
May 5—Castings F. B. Coyle		March—Casting Guns by Centrifugal Process T. C. Dickson	
June 2—Furnaces H. P. McCann		April—Chrome Nickel Steels V. N. Krivobok	
June—Annual Outing (date not set)		May—Nitriding W. J. Merten	
Chicago	Jan. 8—Automobile Steels J. M. Watson	Rochester	Jan. 12—Tool Steel Analysis J. P. Gill
Feb. 12—Ladies Night Paul E. Klopsteg		Feb. 9—Heat and Corrosion Resisting Steels J. P. Gill	
March 12—Industrial Research O. E. Harder		Mar. 9—Armco Iron and Vitreous Enamelling D. M. Strickland	
April 9—Recent Scientific Developments Zay Jeffries			
May—Inspection Trip Zay Jeffries			
Cincinnati	Jan. 8—Carburizing H. W. McQuaid	Rockford	Jan.—Automobile Steels J. M. Watson
Feb. 5—Nitriding A. B. Kinzel		Feb.—Tool Steel W. H. Willis	
March 5—Structural Alloy Steels H. J. French		March—Research and Industry O. E. Harder	
April 5—Alloy Steels J. P. Gill		April—Forgings A. M. Steever	
May 7—	J. P. Gill	May—Tungsten-Carbide Tools Frank R. Palmer	
Cleveland	Jan. 12—Unusual Electric Furnaces H. E. Koch	Springfield	Dec. 15—Arc Welding in Steel Structures & Machinery Design A. M. Candy
Feb. 9—Research H. M. Boylston		Jan. 12—X-Ray Control of Welding and Casting Technique H. H. Lester	
Mar. 9—Liquid Hardening Baths George Barsky and E. C. Moffett		Feb.— Dr. R. S. Williams	
Apr. 13—Metallurgical Features of Front Wheel Drive Raymond Rolfe		March 23—Corrosion Resisting Steels Frank R. Palmer	
Taking "Bugs" from Valve Springs W. T. Donkin		April 20—Alloy and High Test Cast Irons Frank Coyle	
May 11—Light Alloys for Construction W. T. Donkin		May—Educational meeting Frank Coyle	
Visitation Trip to Dirigible Hangar, Goodyear Zeppelin Corp., Akron, O.			
Detroit	Jan. 12—Aircraft Metallurgy Horace Knerr	Syracuse	Jan. 13—Open R. G. Guthrie
Feb. 9—Surface Hardening A. B. Kinzel		Feb. 10—Stainless Steel Jerome Strauss	
March 9—Cast Iron R. N. Allen		March 10—	
April 13—Tool Steels J. P. Gill		April 14—	
May 16—Ann Arbor Meeting J. P. Gill			
Hartford	Jan. 13—Electro Plating E. L. Wood	Tri-City	Jan.—Special Smoker C. W. Page
Feb. 10—The Abrasive Industry Allen Seymour		Feb.—X-Ray Analysis C. W. Page	
March 10—Welding Mr. S. Martin, Jr.		March—Pyrometers and Controls Mr. Taylor	
April 14—Metallurgists in Industry Zay Jeffries		April and May—Tentative Mr. Taylor	
May 12—Forgings J. R. Adams			
		York	Jan. 14—Tool Steel Hardening B. F. Shepherd
			February 11—Elec. Furnace Heat Treatment Jordan Korp
			March 11—Large Forgings J. R. Adams
			April 17—Aircraft Metallurgy H. C. Knerr

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This bureau is for all members of the Society. Want ads will be printed at the following rates: minimum of 30 words \$0.50; each additional word \$0.02.

This service is also for employers, whether members of the Society or not. Rates for this service are as follows: minimum of 50 words \$1.00; each additional word \$0.02. Fee must accompany copy.

Address answers care of AMERICAN SOCIETY FOR STEEL TREATING, 7016 Euclid Ave., Cleveland, unless otherwise stated.

POSITIONS OPEN

SALES MANAGER: Middle west; long years' experience in the tool steel trade and good connections among middle west users and distributors essential; Chicago resident preferred; write fully, giving references. Address 12-5.

DESIGNING ENGINEER: experience either as an executive engineer or under a successful chief; we prefer one who is experienced in the design, installation and operation of industrial furnaces. This is an exceptional opportunity for the right man. State age, experience and expectations in first letter. Address 12-20.

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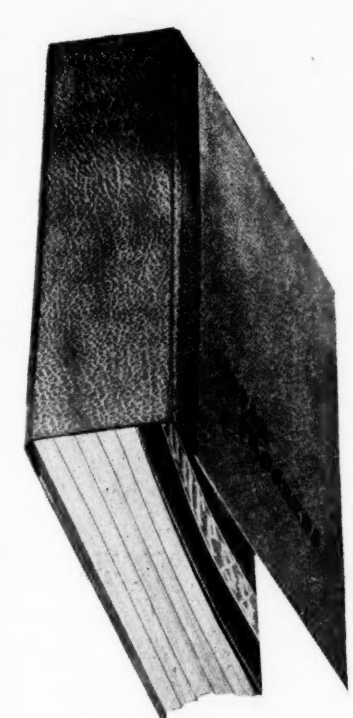
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Signed

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FURNACE, NOT FUEL AFFECTS TREATMENT

R. M. Keeney Discusses Heat Problems Before Hartford Men

By J. Allison

It isn't the fuel but the furnace which determines heat treating results, was the topic of the address given Nov. 12 before the Hartford chapter of the A. S. S. T. by Robert M. Keeney, industrial engineer of the Connecticut Power and Light Co. and a member of the chapter. He presented data to disprove that absolute uniformity of furnace temperature can be obtained by either gas or electricity and scouted the idea of the "intangible" value for gas and electricity. On the other hand, he showed that gas and electricity are not higher cost fuels than oil, butane, coal, etc., in a great many heat treating operations.

In dealing with the problem, "Heat for Heat Treatment", Mr. Keeney discussed it from the angle of the user of furnaces who is interested in obtaining a better product at a lower, over-all cost. He analyzed the factors entering into furnace design and fuel utilization and he illustrated how the factors must be balanced to obtain the best results.

In producing a uniformly heated product, skilled metallurgical supervision and the form of furnace are more important than the source of heat. With the form of furnace determined, the selection of the source of heat depends upon its ease of application to the furnace, with reference to control of liberation of heat, control of temperature, and control of atmosphere, and upon its ultimate effect on the overall cost of the finished product. It is not a problem of B. T. U. costs but an economic problem of over-all costs.

Form of furnace affects materially most of the factors involved in the production of a uniformly heated product—the essential quality of production. Its influences:—(1) Uniformity of chamber temperature—(2) manner of heat application to the charge—(3) rate of heating—(4) time of exposure—(5) temperature control and—(6) atmosphere of furnace.

Relative uniformity of chamber temperature in combustion furnaces depends upon the correct method of firing, a suitable number of burners, and a carefully planned flue system and, in the electric furnace, upon proper distribution of heating elements. It depends upon the furnace designer, not upon the source of heat, although the less refined sources of heat require greater skill in furnace design.

The source of heat influences quality production at a low over-all cost of finished product but the cost is determined by skilled metallurgical supervision of the operation of the correct form of furnace, heated by the source of heat best adapted to the form of furnace and to the process, with due consideration given to the relative heat costs of the source of heat available and to the quality of product desired. B. T. U. cost cannot be considered alone but must be linked with the cost of preparation for utilization, efficiency of utilization, and application to the process and to the form of furnace which seems best to fit the manufacturing requirements of the plant.

Quality must be evaluated in terms of marketability and competition, or in terms of loss of market and increased costs due to a high percentage of rejections. When viewed from the broad angle of the ever increasing demands of modern civilization on the products of industry and from the competitive market situation, temporarily high costs might prevail in the interests of improved quality.

In closing Mr. Keeney emphasized the benefits to be derived by making a thorough investigation of all the conditions in each plant. The benefits have many times included the discovery of weak spots in plant practice outside of the heat treating room.

PITT MEN HEAR STOUGHTON

Czechoslovakian Meeting of British Iron and Steel Institute Reported

By Robert E. Dinkley

Dr. Bradley Stoughton gave us a very interesting paper on "The Czechoslovakian Meeting of The Iron & Steel Institute of London" at the recent meeting of the Pittsburgh chapter. The four outstanding things that Dr. Stoughton impressed us with were:

First—Rapidity of open hearth heats, five to six heats per day were common practice. They favor the tilting furnace with shallow hearth. The sloping back wall with which we are familiar, they know nothing about;

Second—Their great interest in research and quickness to discard old and obsolete methods for new; third—Ingot refining by pressing the ingot while cooling; fourth—Rationalism of labor.

INDIANAPOLIS MEETING BIG

W. R. Leffler Presents Paper on Gear Steels After Gear Plant Visit

By Wm. H. Knowles, Jr.

The Warner Gear Co., at Muncie were splendid hosts to the Indianapolis chapter for our November meeting. Sixty-five members and guests from Indianapolis, Lafayette, Anderson, and nearby cities inspected the heat treating department and laboratory of the company and later assembled for dinner at the Roberts Hotel.

W. R. Leffler, metallurgist of the Central Alloy Division of the Republic Steel Corp., opened the evening with a movie on the making of steel and later presented a paper on gear steels. Discussion brought out the need for close co-operation between the steel manufacturer, the mechanical engineer, the metallurgist, and the production man.

Thanks are due E. F. Davis of the Warner Gear Co., for making the inspection trip possible. The meeting and speaker drew the largest attendance of any of the year.

"PRACTICAL X-RAYS" CLEVELAND SUBJECT

Drs. Fink and Van Horn Tell Uses of X-Ray in Analysis

By W. E. Benninghoff

At the dinner in Kaase's restaurant preceding the November meeting of the Cleveland chapter, Gordon Cobbedick, sports editor of the *Cleveland Plain Dealer*, gave a coffee-talk on "Sports". The seventy-five members and guests present thoroughly enjoyed the talk, which was concerned mostly with football and baseball.

After dinner we adjourned to the Cleveland Engineering Society rooms, where 150 members and guests came to order when Chairman Ayling rapped the gavel to open the meeting on "Practical Applications of X-Ray Crystal Analysis".

The first speaker, Dr. Fink, of the U. S. Aluminum Co., traced the development of metallurgical tools from microscope to X-Ray. The X-Ray tube was then described in detail, as well as the manner in which it functions. Some time was then spent in describing how crystals are formed, their various types and how the crystal planes reflect X-Rays, making X-Rays analysis possible. Dr. Fink made liberal use of slides in this description.

Dr. Van Horn, also of the U. S. Aluminum Co., then gave further descriptions and applications of X-Ray methods. The powder, monochromatic pinhole and Laue methods were described in detail, as well as how they are used in industry.

Some of the uses of X-Ray analysis described by Dr. Van Horn are chemical analysis, study of aluminum, mirror glass, etc. He also showed how X-Rays were used in the analysis of alloys in solid solution, eutectic state or in the form of intermetallic compounds, and how the stability and the properties of alloys could be predicted.

X-Rays are also used in the analysis of transformer sheets to predict hysteresis loss. The determination of internal stress in castings is another use of X-Ray analysis, although, as Dr. Van Horn mentioned, this is not a production process. The analysis of welds is another use of X-Ray in industry.

Dr. Van Horn described in detail the use of the monochromatic method in the study of deformation of metals. Slides of X-Ray photographs made by this method on worked metals before annealing and worked metals after annealing were shown for wires, sheets, etc. He also showed how the amount of maximum working before annealing is determined by means of X-Ray analysis.

KELLER ENDS SECOND COURSE

Continued from Page One

parts such as chains, bolts, and other machine parts. The Iron-Carbon diagram explained.

Lecture No. 4. Solid solution theory. The decalcification and recalcification points clearly illustrated and demonstrated by an electric device that clearly visualizes these phenomena in the hardening of tool steel and the heat treating of machinery parts. The carburizing of steel and its heat treatment.

Lecture No. 5. Tempering (drawing) of tool steel and the tempering of machinery parts to develop toughness and fatigue resistance. The heat treatment of high speed and alloy steels. A brief outline of metallography showing photomicrographs of steel when properly and improperly heat treated.

Lecture No. 6. Why iron and steel warps and cracks in the various operations of heating and cooling. This phase of the subject will also be touched upon from the foundry angle.

ROCKFORD MEN HEAR TALK ON NITRIDING

Dr. Norton Deplores Lack of Attention to Decarburization

By C. B. Sadtler

Nitriding was the subject of the lecture given by Dr. J. T. Norton, chemical engineer of the Associated Alloy Steel Co., on November 12, at the regular meeting of the Rockford Chapter.

In addition to a general discussion of the nitriding process, Dr. Norton also emphasized a number of details of the process which his four years of constant experience have proved to be of great importance in determining success or failure. It was pointed out that even at this date, too little attention is paid to complete elimination of decarburization on surfaces which are to be nitrided.

Of almost as great importance Dr. Norton considers the proper heat treatment of the base metal. The preferred structure, generally speaking, is sorbitic. Completely annealed structures are considered undesirable, and for this reason bars are being supplied by steel mills in a heat treated condition.

Dr. Norton's talk stimulated an unusual amount of discussion, some of which dealt in some detail on the forgeability of nitralloy. It appears that the surface condition of nitralloy ingots has to be carefully controlled in the mill to insure as great a degree of forgeability as is expected with the older types of structural alloy steels. This control of ingot surface stands as one of the real achievements in the development of nitralloy.

In connection with the forging, it was brought out that because of the sluggish behaviour of the constituents of the alloy, an adequate forging heat could not be obtained as quickly as is the case with some of the older alloy steels. This same characteristic also requires holding for longer periods at both quenching and drawing temperatures.

While nitralloy has not been especially useful in the field of cutting tools, there are some successful applications in die work, especially where high intensities of pressure are not involved. In order to extend its use to somewhat higher pressures, developments are under way, Dr. Norton stated, which involve the use of raising the carbon content of the base material as well as other modifications in analysis.

From the purely economic point of view, interest has always attached to the possible replacement of carburizing steels by nitralloy. Dr. Norton considers that this replacement will probably never be extensive, although further refinements for methods in producing alloy will bring the price of nitralloy fairly close to that of competitive carburizing steels.

FRENCH TALKS AT ONTARIO

Continued from Page One

cooled by water flowing past it in a fixed direction, and this served to illustrate the practical value of the figure eight movement in quenching.

Other points of interest which were taken up included the influence on the final result from differences in manufacture, in previous heat treatment, in grain structure, in the nature of the surface and the amount of oxidation of the steel. A heavy scale for instance on account of flaking off readily gives less trouble than a light adherent scale.

J. B. JOHNSON GIVEN MEDAL

Gets Morehead Award From Acetylene Association for Work in Welding

J. B. Johnson, chief of the Material Branch at Wright Field, Dayton, O., was awarded the Morehead Medal of the International Acetylene Association at a meeting in Chicago on Nov. 14. Mr. Johnson received the medal, which every year is presented to the man who did the most in that year for the promotion of the acetylene industry, for his work in aircraft welding.

Many chapters of the American Society for Steel Treating have heard Mr. Johnson describe the methods and practices of welding aircraft tubing. He is a member of the Dayton chapter of the Society.

MAKES REFRACTORIES MOVIE

Harbison-Walker Co. offers 5000-Foot Film

The Harbison-Walker Refractories Co., Pittsburgh, has just completed a 5000-foot motion picture illustrating modern methods employed in the manufacture of refractories. The film shows the production of refractories from the mining of raw materials to the finished product.

This film, is available, without cost, to technical societies, engineering organizations, industrial organizations, universities, colleges, technical schools and research laboratories.

A new type of heavy duty roller conveyors has been designed by the Mathews conveyor, Elwood City, Pa. The conveyor is described in a pamphlet available from the manufacturers.

The Trent line of electric heating elements and units is described in a pamphlet, Ta-29, issued by the Harold E. Trent Co., 439 N. 12th St., Philadelphia.

Corrections for National Metal Handbook

You should note carefully the following corrections for Metals Handbook and make proper notations on the pages indicated:

PAGE 37—In the first column on page 37, item thirty-seven is: 21. Duraloy. This should read: 21. Dualoy.

PAGE 150—The first column of Table I on page 150 is headed "Diameter of Chain Stock, Inches". In this column the next to the last figure is 1½. This should read 1¼.

PAGES 228, 229, and 230—In the tables given on these pages, the chemical compositions are given for the S.A.E. nickel, nickel-chromium, molybdenum, chromium, chromium-vanadium, tungsten, and silico-manganese steels. These tables should carry the following footnote:—

Silicon range of all S.A.E. basic open-hearth alloy steels shall be 0.15 to 0.30 per cent. For electric and acid open-hearth steels the silicon content shall be a minimum of 0.15 per cent.

PAGE 279—In Fig. 7 on page 279 the curve marked **Elon. in 2"** should be marked **Izod**. The curve marked **Izod** should then be marked **Elon. in 2"**.

PAGE 409—Etching solution 4a on page 409 under the headings "Remarks" and "Used to Show" should read as follows:

Remarks	Used to Show
Warm the specimen in hot water before etching. For best results use method of alternate polishing and etching. Proposed by Viella.	Structure of medium and high carbon iron-chromium base alloys and high speed steel. May be used for etching iron-chromium base alloys containing Al, W, Mn, V and Mo.

PAGE 411—In the etching solution No. 6 on page 411 under the heading **REMARKS**, change the words **Distilled Water to Alcohol**.

PAGE 619—On page 619, line 28, change the 1.4 to 2.4.

This list can be pasted on the flyleaf of the Handbooks

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